

WIND TURBINE SIZING OF A WIND POWER SYSTEM

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Wind energy has been used over the centuries for sailing, pumping water, and grinding grains. Collection techniques have evolved but past knowledge is still useful today. Recently the wind turbine hybrid system is getting more and more popular and useful. This is due to the increasing costs of fossil fuel based energy and advances in wind turbine technology. It is vital to properly select the type and the size of a wind turbine that feeds the loads in a standalone power system.

In this poster, the selection and sizing of the proper wind turbine for a certain hybrid power system will be introduced. Three factors need to be taken into consideration when sizing a wind turbine – wind information for a particular site, the power output of the wind turbine, and axis type of the wind turbine. In practice, the average power output of a particular wind turbine at a particular site can be determined by analyzing the relationship between the power curve and the wind distribution curve. The power curve is used to establish a relationship between the wind speed and the power output. It helps to estimate the power output at certain wind speed in a particular geographical location. The wind distribution curve plots the frequency of each wind speed and is used to determine how often a particular wind speed occurs. Lastly, there are two major types of axis design that need to be considered. The Horizontal Axis Wind Turbine (HAWT) has a lower solidity ratio (ratio of blade area to swept area) at a given tip speed ratio. The Vertical Axis Wind Turbines (VAWTs) has a simpler hardware design and lower costs. There are advantages and disadvantages of both, but each has its own purpose.